

## Announcement of Opportunity Webinar



2 December 2022



10:30- & 16:30- CET



UNITED NATIONS  
Office for Outer Space Affairs



CENTER OF  
APPLIED SPACE TECHNOLOGY  
AND MICROGRAVITY





# Access to Space for All

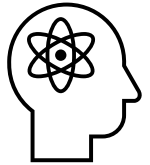
## Space Technology Capacity Building



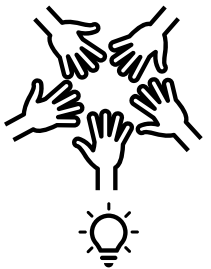
The goal of the Access to Space 4 All initiative is to provide research and orbital opportunities for UN Member States **to access space and to ensure that the benefits of space, in particular for sustainable development, are truly accessible to all**



**Provides the possibility of developing hands-on capabilities** from A-Z in to promote the safe and sustainable use of outer space



**Provides cutting edge skills** for jobs and other opportunities



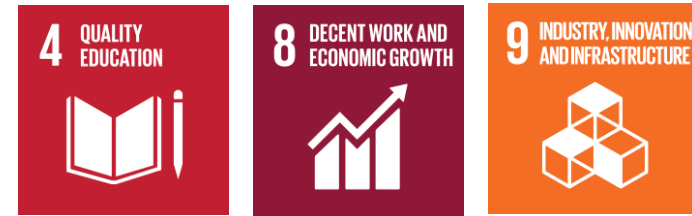
**Fosters international cooperation** between the UN, space-faring partners, and applying developing nations



**Has a strong social impact** to the country, regions, and young generations

### Access to Space for All in Numbers

- **9** Hands on Opportunities
- **1** Annual Fellowship
- **27** Awardees involving **42** Entities from **30** countries
- **4** CubeSats launched
- **7** Microgravity Experiments performed
- **16** projects in development
- **62** Scholarships granted
- **70+** Hours of educational content on YouTube



#### SPACE AGENCIES



#### RESEARCH INSTITUTIONS AND UNIVERSITIES



#### PRIVATE SECTOR







# Access to Space for All

## Impact of the initiative



### HyperGES "Watermeal, the Future Food Source for Space Exploration"



#### HyperGES and community impacts

- Expand space-related knowledge and awareness in Thailand
- Flagship program in astroculture, produce intensive research environment
- Team up with other organization. Stepping out of their comfort zone encouragement

**Ellas construyen el satélite guatemalteco**

Conozca a las siete estudiantes que participan en el proyecto del CubeSat.

**ACTA AERONAUTICA**  
Número 174, Agosto 2020, Páginas 346-350

**Free surface reconstruction of opaque liquids in microgravity. Part 1: design and on-ground testing**  
A. Romero-Cabrer<sup>1</sup>, A. J. García-Salcedo<sup>1</sup>, F. Gámez<sup>1</sup>, I. Rivero<sup>2</sup>, G. Casó-Gómez<sup>3</sup>, E. Castro-Hernández<sup>4</sup> and F. Magg<sup>5</sup>

**Free surface reconstruction of opaque liquids in microgravity. Part 2: results of drop tower campaign**  
A. Romero-Cabrer<sup>1</sup>, F. Gámez<sup>1</sup>, A. J. García-Salcedo<sup>1</sup>, I. Rivero<sup>2</sup>, G. Casó-Gómez<sup>3</sup>, E. Castro-Hernández<sup>4</sup> and F. Magg<sup>5</sup>

**Free and Forced Oscillations of Magnetic Liquids Under Low-Gravity Conditions**  
Araon Romero Cabrer, Gabriel Casó Gómez, Elena Castro Hernández, Filippo Magg

### FIRST MAURITIAN SATELLITE – OPENING NEW OPPORTUNITIES

JOURNEY TO SPACE ALTHOUGH NOT EASY BUT EXTREMELY REWARDING AND OFFERS HIGHLY PROMISING FUTURE

#### MAURITIUS EMBARKS IN NEW SPACE ERA

- Geolocation interesting for future space related activities
- More advanced space nations interested to collaborate

#### BOOST TECHNICAL CAPACITY

- Building highly technical capacity
- Sophisticated ground station for future missions set up
- Training of younger generation

#### A POTENTIALLY NEW SOCIO-ECONOMIC PILLAR

ilities for Mauritius. Data &D, business ntal collaborations.



#### ENTHUSIASTIC YOUNGSTERS

- The training program on antenna building gave us an insight of the high level of enthusiasm for this new field. There is hope to enhance this interest further to build new capacity.

#### GOVERNMENT FULLY SUPPORTIVE

- This historical initiative for the Republic of Mauritius promises to unlock new opportunities for research, innovation and socio-economic development.

## Aerospace, AI and Digital Centre



ESPIITA was able to grow , to expand by inauguration AEROSPACE, AI AND DIGITAL CENTER on July 2022



### Guatemalan team launches nation's 1st CubeSat, wins Interplanetary Initiative prize

International student team recognized for its success through adversity



June 6, 2022

When members of the team that built the Quetzal-1 CubeSat watched their satellite take off on a SpaceX Falcon 9 rocket in 2020, it was the culmination of six years of hard work, overcoming financial and personnel hurdles, and challenging cultural barriers.

That hard work and ingenuity has garnered the team the CubeSat Delivery Prize award through Arizona State University's Interplanetary Initiative. The award is just the latest step in the team's remarkable journey.

### 3. How has participating in DropTES changed the environment around you?

**RESEARCH CENTER**

**MECHATRONICS DEPARTMENT**

### 3. How has participating in DropTES changed the environment around you? Cont'd (3)

In Feb. 2017 I was elected to be the President of the American University of Madaba (AUM) in Jordan. That month AUM started the Innovation project for its students and for high school students in Jordan at large.







# Access to Space for All

## Structure of the initiative

### HYPERGRAVITY AND MICROGRAVITY

Building capacity for conducting experiments in orbit



Hands-on opportunities in hypergravity and microgravity from ground to orbit



Open source tools bridging hands-on and education components



Educational material for building up experiments

### SATELLITE DEVELOPMENT

Building capacity that enables the development, deployment, and operation of satellites



Hands-on opportunities for satellite deployment



Open source tools bridging hands-on and education components



Educational material supporting the whole life-cycle of satellites

### SPACE EXPLORATION

Broadening the engagement in space exploration



Hands-on opportunities to engage in space exploration



Open source tools bridging hands-on and education components

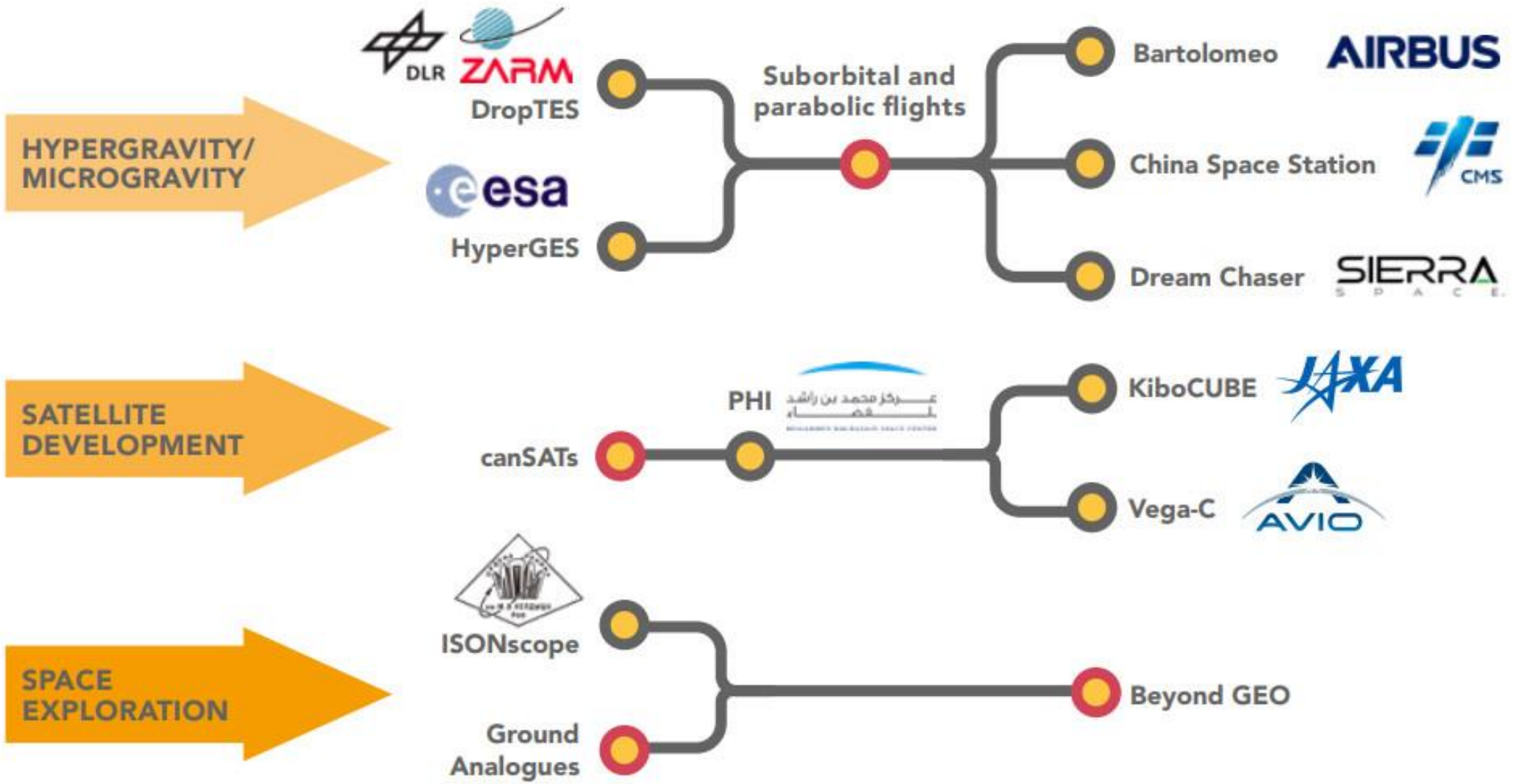


Educational material for space exploration



# Access to Space for All

## Hands-on Component





## Why should you conduct experiments in microgravity?

- **Achievable entry point** to acquire knowledge and skills through conducting various experiments in many different scientific fields
- **Beneficial first step to start capacity-building** for space activities



# What is DropTES?



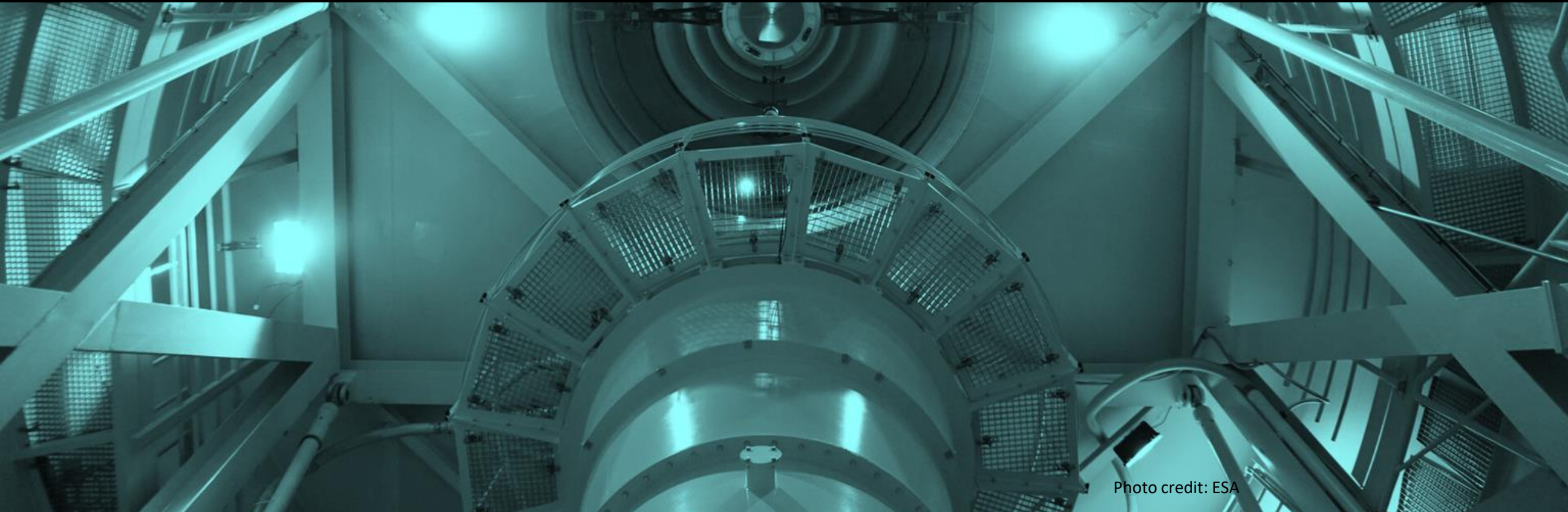
A fellowship programme between United Nations Office for Outer Space Affairs (UNOOSA), ZARM (Center of Applied Science Technology and Microgravity) and DLR (German Aerospace Center) which started from 2014



Aims to provide opportunities to conduct a series of microgravity experiments at the Bremen Drop Tower and [NEW!]GraviTower Bremen Pro



The experiment campaign consists of 5 drops or catapult launches at the Bremen Drop Tower or half-days at the GraviTower Bremen Pro to be conducted within one week. Each experiment series is accompanied by an on-site experiment integration taking place one week prior to the campaign.



# Why DropTES?



## Access to state-of-the-art & unique ground infrastructure



- The Bremen Drop Tower is one of the tallest drop towers in Europe and the experiment duration has been extended to 9.3 seconds which is unmatched by any other drop facility worldwide.
- The new GraviTower Bremen Pro can perform experiments up to 960 times a day, which are not limited to microgravity (max. 2.5 seconds,  $< 10^{-4} g_0$ ).



# Why DropTES?



## Generous technical and financial support

- DLR will bear the cost to conduct the series of experiments.
- ZARM will provide technical support during the campaign along with on-site apartment for student accommodation.
- UNOOSA will provide financial support for the travel of the selected team.

**All you have to do is develop your experiment and bring it to Germany!**



## Experience the entire experiment cycle








Writing an application, planning the project, designing/developing/manufacturing/testing the prototype, coordinating other necessary things, conducting the actual experiment, analysing, presenting the results, outreaching...



# DropTES

## Awardees



	Winner		Objective
1 <sup>st</sup> round 2014	German Jordanian University JORDAN		to investigate the stability of tether dynamics for satellites with electromagnetic tether systems using a Tilger, a mass damper
2 <sup>nd</sup> round 2015	Universidad Católica Boliviana "San Pablo" BOLIVIA		to examine and evaluate the property of an alloy of Nickel and Titanium "Nitinol" under the microgravity environment
3 <sup>rd</sup> round 2016	Instituto Tecnológico de Costa Rica Universidad de Costa Rica COSTA RICA		to expand the technical knowledge and information on the behaviour of a reduced-scale robotic arm manipulator such as dynamics, motion, and control under microgravity conditions
4 <sup>th</sup> round 2017	Warsaw University of Technology POLAND		to verify, in vacuum and microgravity conditions, the deployment of the deorbit sail system on their two-unit CubeSat called "PW-Sat2"
5 <sup>th</sup> round 2018	University of Bucharest Politehnica University of Bucharest ROMANIA		to expose medicine droplets containing aqueous chlorpromazine (CPZ) solution to both laser radiation and microgravity conditions
6 <sup>th</sup> round 2019	Politecnico de Milano (Polimi) ITALY		to analyze the lateral sloshing of a ferrofluid solution in low-gravity with the aim of measuring its oscillation frequency while subjected to different magnetic field intensities.
7 <sup>th</sup> round 2022	Universidad Católica Boliviana "San Pablo" BOLIVIA		to determine the 3D printing feasibility under microgravity conditions, measure intra-structure remaining liquid resin after light exposure and compare manufacturing time, amount of used material, while processing the same piece between 2 different approaches (Fused Deposition Modeling (FDM) and Digital Light Processing (DLP))

<https://www.unoosa.org/oosa/en/ourwork/access2space4all/Awardees.html>





# DropTES Awardees



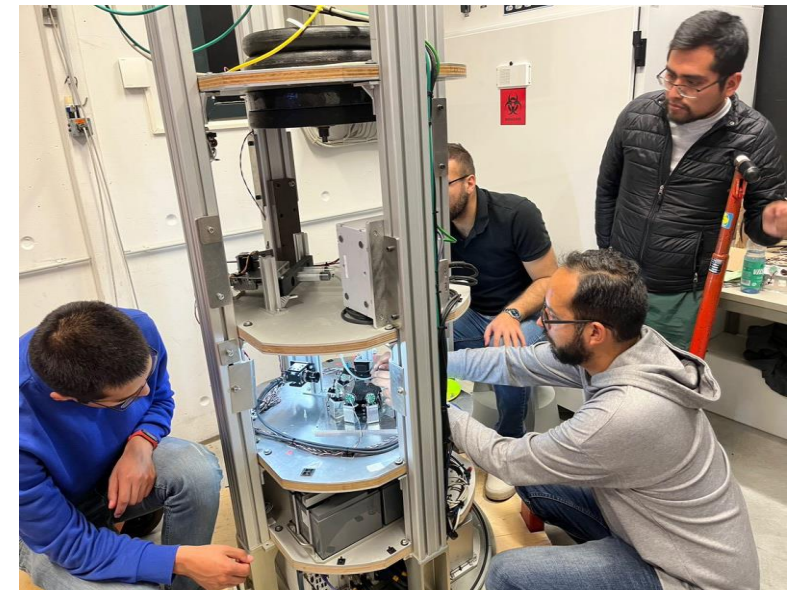
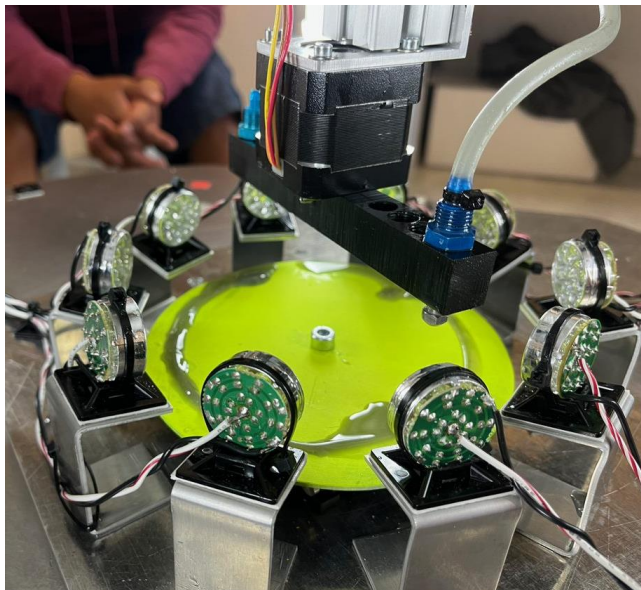
## Universidad Católica Boliviana "San Pablo" awardee of DropTES 2nd & 7th round

- In 2015, the team **examined and evaluated the property of Nitinol**, which is a metal alloy often used in medical devices.
- In 2022, the team tested **3D printing techniques using liquid resin**, which could lead to new applications in various fields.



The **technical expertise and skills acquired through the experiments** helped develop ventilators during the COVID19 pandemic.

[https://www.unoosa.org/oosa/en/ourwork/access2space4all/awardees/bolivia\\_ucb.html](https://www.unoosa.org/oosa/en/ourwork/access2space4all/awardees/bolivia_ucb.html)

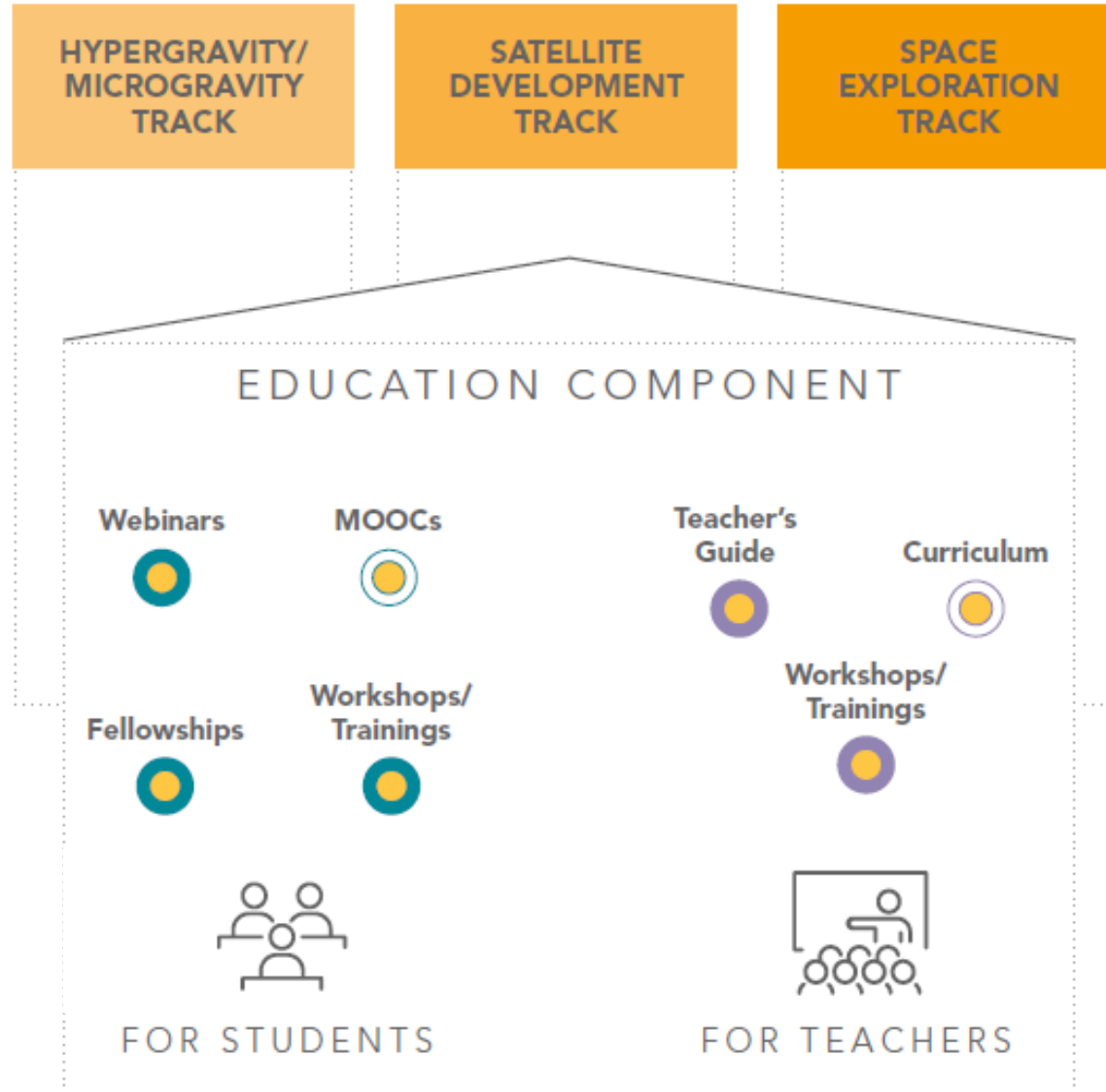






# Access to Space for All

## Education Component







# DropTES

## Dedicated Webinars for DropTES



UNITED NATIONS  
Office for Outer Space Affairs



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Office for Outer Space Affairs



About Us - Our Work - Space4SDGs - Information for... - Events - Space Object Register - Documents - COPUOS 2023

Our Work > Access to Space for All > Opportunities > Hypergravity/Microgravity Track



ACCESS TO SPACE FOR ALL  
HYPERGRAVITY AND MICROGRAVITY  
TRACK WEBINARS

### Our Work

- Secretariat of COPUOS
- Programme on Space Applications
- UN-SPIDER
- International Committee on GNSS
- UN-Space
- UNISPACE+50
- Space Law

## Hypergravity/Microgravity Track Webinars

### DropTES webinars

#### DROPTES 8TH ROUND Q&A SESSION (AS A PART OF THE HYPERGRAVITY/MICROGRAVITY WEBINAR SERIES)

6 June 2021 For the materials click [here](#)  
 - Detailed explanation of Announcement of Opportunity by UNOOSA  
 - Q and A

#### HOW TO BUILD A GREAT APPLICATION FORM

11 February 2021  
 Click [here](#) for the video  
 - Introduction of DropTES by UNOOSA ( [pdf](#) and [video 6:20-23:43](#) )  
 - Introduction of Bremen Drop Tower and ZARM by ZARM ( [pdf](#) and [video 25:11-53:01](#) )  
 - Detailed explanation of Announcement of Opportunity and Application Form ( [video 54:04-1:19:17](#) )  
 - Q and A ( [video 1:19:35](#)- "The afternoon session Q&A is followed by the morning session Q&A")

#### EXPERIENCES FROM THE PAST WINNERS OF DROPTES

11 November 2020  
 Presentations

- Remarks from the Permanent Mission of the Federal Republic of Germany to the United Nations (Vienna) ( [video](#) )
- UNOOSA: Overview of DropTES - Hazuki Mori ( [pdf](#) and [video](#) )
- ZARM: UN fellowship program at the Bremen Drop Tower - Thorben Könemann ( [pdf](#) and [video](#) )
- DropTES winner 2014 - Nabli Ayoub and Farah Atour ( [pdf](#), [video AM session](#), [video PM session](#) )
- DropTES winner 2015 and 2020 - Jhon Ordoñez ( [pdf](#) and [video](#) )
- DropTES winner 2016 - Moacir Fonseca-Becker ( [pdf](#) and [video](#) )
- DropTES winner 2018 - Agota Simon ( [pdf](#) and [video](#) )
- DropTES winner 2019 - Alvaro Romero-Calvo, Antonio J. Garcia-Salcedo ( [pdf](#), [video AM](#), [video PM](#) )

#### Questions and Answers

- What are the requirements to apply to DropTES?
- Is this opportunity open for artistic performances or experiences?
- What is the different between drop and catapult mode? and what is the share of experiments in each mode?
- Can the gravity be controlled to meet a certain value?
- What is the g-force in a catapult launch?
- What are the conditions of the deceleration chamber?
- What is best thing of taking part in DropTES and the most complicated thing of

[https://www.unoosa.org/oosa/en/ourwork/access2space4all/HMTrack\\_Webinars.html#Tag1](https://www.unoosa.org/oosa/en/ourwork/access2space4all/HMTrack_Webinars.html#Tag1)



# DropTES

## Conducting R&D in Hypergravity/Microgravity



### 9 webinars with 45 speakers from 40 entities in 13 nations

Covered technical and fundamental knowledge on:

- Benefits of conducting R&D in Hypergravity/Microgravity environment
- What type of R&D can be done (with examples from life science, physical science, and technology demonstration)
- Existing available platforms, opportunities, and networks

No.	Contents
1	Introduction to Hypergravity/Microgravity
2	Life Science Part 1: Biology
3	Life Science Part 2: Physiology
4	Life Science Part 3: Pharmacology
5	Physical Science Part 1: Material Science
6	Physical Science Part 2: Fluid Dynamics
7	Technology Demonstration
8	UNOOSA Hypergravity/Microgravity Track Opportunities
9	Regional Hypergravity/Microgravity Activities



### Space Biology and Altered Gravity

**Why study biological effects of microgravity?**

- All life on earth have evolved in the Earth's gravitational field. We have little knowledge of what happens to organisms in the apparent absence of this force.
  - Studies in microgravity will tell us how biological systems acclimate and adapt to this new environment
  - Studies in microgravity will also reveal how gravity has driven evolution and continues to influence biological process on Earth.

**Why study biological effects of hypergravity?**

- During space flight, living systems are not only exposed to microgravity, but also experience around 3 g during launch and 3+ g more landing.
- Chronic hypergravity models can be used complement and predict microgravity-associated changes (i.e., the shift from 2 g to 1 g may recapitulate aspects of the shift from 1 g or microgravity).

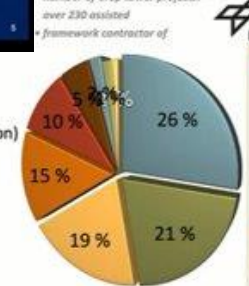
### Gravity has (mainly) impact on:

- Weight
- Hydrostatic Pressure
- Convection
- Buoyancy
- Sedimentation

NB: Spaceflight holds more variables: e.g. isolation, radiation, (pressure, gas composition), stress, training, ...

[https://www.unoosa.org/oosa/en/ourwork/access2space4all/HMTrack\\_Webinars.html#Tag6](https://www.unoosa.org/oosa/en/ourwork/access2space4all/HMTrack_Webinars.html#Tag6)

- Combustion
  - Fundamental Physics
  - Fluid Dynamics
  - Astrophysics (Planet Formation)
  - Materials Sciences
  - Biology
  - Hardware Tests
  - Student Programs
  - Chemistry
- › fundamental research  
› technology development (mission preparations)





**Any questions?**

**Contact us**

 [\*\*unoosa-access-to-space@un.org\*\*](mailto:unoosa-access-to-space@un.org)

**Help us help  
#AccSpace4All**



**Download and learn more about us!**